



Amendments to the Claims:

This listing of claims replaces all prior versions and listings of claims in the application:

Listing of Claims:

1. (Previously presented) Apparatus comprising:

means for directing a measurement wavefront to reflect from a measurement surface and a reference wavefront to reflect from a reference surface, the measurement and reference wavefronts being derived from a common light source;

means for directing the reflected measurement and reference wavefronts to overlap with one another and form an interference pattern, wherein paths for the measurement and reference wavefronts define an optical measurement surface corresponding to a theoretical test surface that would reflect the measurement wavefront to produce a constant optical path length difference between the measurement and reference wavefronts; and

means for varying the radius of curvature of a locally spherical portion of the optical measurement surface to contact a conical portion of the measurement surface, and detecting the interference pattern as a function of the radius of curvature.

2-5. Cancelled.

6. (Previously presented) Apparatus comprising:

means for directing a measurement wavefront to reflect from a measurement surface and a reference wavefront to reflect from a reference surface, the measurement and reference wavefronts being derived from a common light source having a coherence length;

means for directing the reflected measurement and reference wavefronts to overlap with one another and form an interference pattern, wherein paths for the measurement and reference

wavefronts define an optical measurement surface corresponding to a theoretical test surface that would reflect the measurement wavefront to produce a constant optical path length difference between the measurement and reference wavefronts; and

means for varying the radius of curvature of a locally spherical portion of the optical measurement surface to contact the measurement surface, and detecting the interference pattern as a function of the radius of curvature, wherein the radius of curvature is varied over a distance greater than the coherence length of the light source.

7-93. Cancelled.

94. (New) An interferometry system, comprising  
an interferometer positioned to derive a measurement wavefront and a reference wavefront from a light source, wherein the interferometer is configured to direct the measurement wavefront to reflect from a measurement surface and the reference wavefront to reflect from a reference surface, and further directs reflected measurement and reflected reference wavefronts to overlap with one another and to form an interference pattern, the interferometer comprising measurement optics configured to shape the measurement wavefront so that the measurement wavefront is divergent at the measurement surface and comprising reference optics configured to shape the reference wavefront prior to the reference surface;  
a detector positioned to detect the interference pattern; and  
a translation stage coupled to the interferometer and configured to translate reference optics and reference surface to vary an optical path difference between the reflected measurement wavefronts and reflected reference wavefronts at the detector.

95. (New) The interferometry system of claim 94, wherein the reference optics are configured to shape the reference wavefront so that the reference wavefront is divergent at the reference surface.

96. (New) The interferometry system of claim 94, wherein the measurement optics are positioned in the path of the measurement wavefront.

97. (New) The interferometry system of claim 94, further comprising an electronic processor in communication with the detector, the electronic processor being configured to determine a profile of the measurement surface based on the interference pattern detected by the detector as the translation stage translates the reference optics and reference surface.

98. (New) The interferometry system of claim 94, wherein paths for the measurement and reference wavefronts define an optical measurement surface corresponding to a theoretical test surface that would reflect the measurement wavefront to produce a constant optical path length difference between the measurement and reference wavefronts.

99. (New) The interferometry system of claim 98, wherein the constant optical path length difference is a zero optical path length difference.

100. (New) The interferometry system of claim 94, wherein the reference optics are positioned to direct the reference wavefront to the reference surface and to direct the reflected reference wavefront to the detector.

101. (New) The interferometry system of claim 94, wherein the reference optics comprise a reference lens that focuses the reference wavefront towards a reference focal point.

102. (New) The interferometry system of claim 94, wherein the reference surface is a planar surface.

103. (New) The interferometry system of claim 94, wherein the reference surface is a curved surface.

104. (New) The interferometry system of claim 94, further comprising an object mount for positioning the measurement surface in the interferometer.

105. (New) The interferometry system of claim 104, wherein the object mount positions an object having a conical measurement surface in the interferometer.

106. (New) The interferometry system of claim 94, wherein the measurement optics are configured to shape the measurement wavefront into a locally spherical measurement wavefront at the measurement surface and to direct the reflected measurement wavefront to the detector.

107. (New) The interferometry system of claim 106, wherein the measurement optics comprise an objective lens, which focuses the measurement wavefront toward a measurement point datum.

108. (New) The interferometry system of claim 94, wherein interferometer comprises imaging optics which image a portion of the measurement surface to an image plane.

109. (New) The interferometry system of claim 108, wherein the imaging optics also image the reference surface to the image plane.

110. (New) The interferometry system of claim 109, wherein the detector is positioned at image plane.

111. (New) The interferometry system of claim 94, wherein the interferometer comprises a telecentric portion.

112. (New) The interferometry system of claim 111, wherein the translation stage varies the optical path length difference between the measurement and reference wavefronts in the telecentric portion.

113. (New) The interferometry system of claim 94, wherein the interferometer is a Twyman-Green interferometer or a Fizeau interferometer.

114. (New) The interferometry system of claim 94, further comprising the light source and the light source has a coherence length and the translation stage varies the optical path difference over a distance greater than the coherence length of the light source.

115. (New) An interferometry system, comprising  
an interferometer positioned to derive a measurement wavefront and a reference wavefront from a light source, wherein the interferometer is configured to direct the measurement wavefront to reflect from a measurement surface and the reference wavefront to reflect from a reference surface, and further directs reflected measurement and reflected reference wavefronts to overlap with one another and to form an interference pattern, the interferometer comprising a telecentric portion and measurement optics configured to shape the measurement wavefront so that the measurement wavefront is divergent wavefronts at the measurement surface;  
a detector positioned to detect the interference pattern; and  
a translation stage coupled to the interferometer and configured vary an optical path length of the reference or measurement wavefront in the telecentric portion of the interferometer.

116. (New) The interferometry system of claim 115, further comprising an electronic processor in communication with the detector, the electronic processor being configured to determine a profile of the measurement surface based on the interference pattern detected by the detector as the translation stage translates the reference optics and reference surface.

117. (New) The apparatus of claim 115, wherein the measurement surface includes a conical surface.

118. (New) The interferometry system of claim 115, further comprising reference optics configured to shape the reference wavefront so that the reference wavefront is a divergent wavefront at the reference surface.

119. (New) The interferometry system of claim 118, wherein the reference optics are positioned to direct the reference wavefront to the reference surface and to direct the reflected reference wavefront to the detector.

120. (New) The interferometry system of claim 118, wherein the reference optics comprise a reference lens that focuses the reference wavefront towards a reference focal point.

121. (New) The apparatus of claim 1, wherein the means for directing the reflected measurement and reference wavefronts to overlap with one another is an interferometer.

122. (New) The apparatus of claim 121, wherein the means for varying the radius of curvature of a locally spherical portion of the optical measurement surface is a translation stage coupled to the interferometer and configured to vary an optical path difference between the reflected measurement wavefronts and reflected reference wavefronts.

123. (New) The apparatus of claim 1, wherein the constant optical path length difference is a zero optical path length difference.

124. (New) The apparatus of claim 123, wherein the radius of curvature is varied over a distance greater than the coherence length of the light source.

125. (New) The apparatus of claim 6, wherein the measurement surface includes a conical surface.

126. (New) The apparatus of claim 6, wherein the means for directing the reflected measurement and reference wavefronts to overlap with one another is an interferometer.

127. (New) The apparatus of claim 126, wherein the interferometer is a Twyman-Green interferometer or a Fizeau interferometer.

128. (New) The apparatus of claim 126, further comprising a means for focusing the reference wavefront towards a reference focal point.

129. (New) The apparatus of claim 128, wherein the means for focusing the reference wavefront comprises reference optics.

130. (New) The apparatus of claim 129, wherein the means for varying the radius of curvature of the locally spherical portion of the optical measurement surface is a translation stage coupled to the interferometer and configured translate the reference optics relative to the interferometer.